

**Girdle, Megan E**

**From:** Giosa, Megan E  
**Sent:** Monday, October 03, 2011 2:31 PM  
**To:** 'Jason Asbury'  
**Cc:** Timmermeyer, William F  
**Subject:** Technical Corrections Water Tank & Access Rd

**RE: WV NPDES Permit No. WV0115924**  
General Permit Registration No. WVR105766  
John D. Furst -Tank Site and Access Road

This office has reviewed the Stormwater Pollution Prevention Plan (SWPPP) and finds the information insufficient to satisfy the General Permit Conditions.

In order to receive coverage under the General Permit, the following additional information and corrections are needed:

1. If the waste material from this site is planned to go to waste/borrow site 3, then this project cannot be started until the permit for the waste site has been obtained.
2. Typically when a ditch is rock lined, rock check dams are not employed but if they are shown on the site plans, they must be installed.
3. The grass-lined section of channel should have rock checks.
4. In the construction schedule
  - a. Topsoil stockpile must be temporarily stabilized.
  - b. Channels must be stabilized as soon as they are installed.
  - c. Inlet protection for culverts must be included in the sequence.
5. Include the minimum vegetation requirements in the plans.

*Except as noted below, stabilization measures shall be initiated as soon as practicable in portions of the site where construction activities have temporarily or permanently ceased, but in no case more than 7 days after the construction activity in that portion of the site has temporarily or permanently ceased.*  
*(a) Where the initiation of stabilization measures by the 7th day after construction activities temporary or permanently ceases is precluded by snow cover, stabilization measures shall be initiated as soon as conditions allow.*  
*(b) Where construction activity will resume on a portion of the site within 21 days from when activities ceased, (e.g., the total time period that construction activity is temporarily halted is less than 21 days) then stabilization measures do not have to be initiated on that portion of the site by the 7th day after construction activities have temporarily ceased.*  
*(c) Areas where the seed has failed to germinate adequately (uniform perennial vegetative cover with a density of 70%) within 30 days after seeding and mulching must be reseeded immediately, or as soon as weather conditions allow.*  
*(d) All diversions must be stabilized prior to becoming functional.*

6. Twelve months seems a bit long for this project to be completed, especially when silt fences is the only sediment control provided for the pad. Either shorten the time frames or provide a sturdier sediment control.

Please submit three (3) copies of the additional information requested within 30 days of receipt of this email. If additional time is needed, please notify this office.

Please be aware that approval for General Permit coverage must be obtained prior to construction.

Sincerely,

*Megan E. Grose*  
Environmental Resources Specialist  
WV Dept. of Environmental Protection  
Division of Water and Waste Management  
601 57th Street SE  
Charleston, WV 25304  
phone: (304)926-0499 x1194  
fax: (304)926-0463  
Visit our Construction Stormwater Webpage  
Check out our EAS BMP Manual





West Virginia Department of Environmental Protection

Division of Water and Waste Management  
601 37<sup>th</sup> Street SE  
Charleston, WV 25304-2345  
Telephone Number (304) 926-0495  
Fax Number (304) 926-0496

Earl Ray Tomblin, Governor  
Randy C. Huffman, Cabinet Secretary  
[www.dep.wv.gov](http://www.dep.wv.gov)

February 4, 2013

STEVEN P. MCGOWAN  
ARROW WV INC  
C/O STEPTOE & JOHNSON, PLLC, PO BOX 1588  
CHARLESTON, WV 25326

RE: Construction projects with active registrations  
under WV/NPDES General Permit No.  
WV0115924-Registration No. WVR105766 in  
Fayette Co.  
Summit Bechtel Reserve-Water Tank Site and  
Access Road

Dear Permittee:

You currently hold an active registration under the WV/NPDES Stormwater Construction General Permit (No. WV0115924). This permit was reissued on December 5, 2012, and became effective on January 4, 2013. Said permit can be found on our website at [http://www.dep.wv.gov/WVNPDES/Programs/Stormwater/csw/Documents/Final\\_Signed\\_2012\\_CSW\\_General\\_Permit.pdf](http://www.dep.wv.gov/WVNPDES/Programs/Stormwater/csw/Documents/Final_Signed_2012_CSW_General_Permit.pdf).

Sites approved from January 1, 2011, thru January 3, 2013, are hereby granted coverage under General WV/NPDES Water Pollution Control Permit WV0115924. No action is required on your part at this time to maintain permit coverage. However, if new or expanded construction activities are proposed on your site, you must apply electronically for registration of those activities.

Please remember that a Notice of Termination (NOT) form must be submitted to terminate permit coverage when stabilization of the site is complete (NOT form enclosed).

Promoting a healthy environment.

February 4, 2013

If you would like to obtain a copy of the new permit (issued on December 5<sup>th</sup>, 2012), please contact Sharon Mullins with the Stormwater Team. She can be reached at (304) 926-0499 Ext. 1132.

If you have any questions, please contact Yogesh Patel at (304) 926-0499, Ext. 1014 or by email at [Yogesh.Patel@wv.gov](mailto:Yogesh.Patel@wv.gov) preferable.

Sincerely,



Scott G. Mandiola  
Director

SCM:yp

Enclosure

cc: Env. Inspector  
Env. Inspector Supervisor

**DEP NPDESEP**

**From:** DEP NPDESEP  
**Sent:** Wednesday, November 14, 2012 8:53 AM  
**To:** DEP NPDESEP; steven.mcgowan@stepco-johnson.com  
**Cc:** armando.benincasa@stepco-johnson.com; jfurst@hmcaphd.com;  
jean.asbury@terraron.com; Handley, John H; Lilly, James K (DEP); Quinn, Deborah I  
**Subject:** Approval of Transfer of Ownership for WVR105766, Summit Bechtel Reserve- Water  
Tank Site and Access Road, Fayette County  
**Attachments:** NOT 14400\_SW\_Cons\_Termination\_notices.doc

Steven P. McGowan  
Arrow WV Inc.  
c/o Stepco & Johnson, YLLC  
PO Box 1588  
Charleston, WV 25326

Physical Site Location: WV Rt. 61, Mount Hope

Please be advised that this e-mail constitutes approval for transfer of WV/NPDES General Water Pollution Control Permit Registration No. WVR105766, issued on October 06, 2011, from Furst, John D. to Arrow WV Inc. has been made in the records of the Division of Water and Waste Management on November 07, 2012. All the responsibilities of the terms and conditions of said permit remains in full force and effect.

Please note that copies of all future correspondence regarding the permit must be forwarded to the Field Inspector and Field Supervisor at the following address:

WV Department of Environmental Protection  
Division of Water & Waste Management  
Permitting and Engineering Branch  
601 57<sup>th</sup> Street SE  
Charleston, WV 25304-2345

Department of Environmental Protection  
Environmental Enforcement  
254 Industrial Drive  
Oak Hill, WV 25901

We've also attached a "Notice of Termination" form to be completed and submitted when all disturbed areas are stabilized.

Your annual permit fee has been assessed as \$500.00. You will be invoiced by this agency upon the anniversary date of this approval date. Failure to submit the annual fee within ninety (90) days of the due date will render your permit void upon the date you are mailed a certified written notice to that effect.

If any questions, please do not hesitate to contact Alice Canley at (304) 926-0499 Ext. 1103 or by email at [Alice.Canley@wv.gov](mailto:Alice.Canley@wv.gov).

Scott G. Mandrolia, Director  
WV DEP-Division of Water & Waste Mgt.  
601 57<sup>th</sup> St. SE  
Charleston, WV 25304-2345

Phone: (304) 926-0495  
Fax: (304) 926-0496

**Cantley, Alice E**

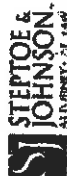
**From:** Timmermeyer, William F  
**Sent:** Friday, November 09, 2012 1:32 PM  
**To:** Cantley, Alice E  
**Subject:** FW: Arrow's Transfer

Finally

**From:** Armando Benincasa [mailto:Armando.Benincasa@steeptoe-johnson.com]  
**Sent:** Friday, November 09, 2012 1:31 PM  
**To:** Timmermeyer, William F  
**Cc:** Steven McGowan  
**Subject:** RE: Arrow's Transfer

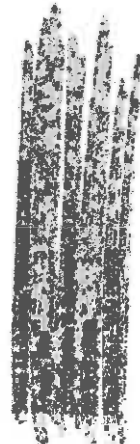
Yes.

**Armando Benincasa**  
Steeptoe & Johnson PLLC  
P.O. Box 1088, Charleston, WV 25328-1088  
Overnight  
Cherry Tower, 6th Floor  
707 Virginia Street, East Charleston, WV 25301  
O: 304-383-6147 F: 304-383-6186 C: 304-350-0921  
armando.benincasa@steeptoe-johnson.com  
www.steeptoe-johnson.com



**From:** Timmermeyer, William F [mailto:William.F.Timmermeyer@wv.gov]  
**Sent:** Friday, November 09, 2012 12:19 PM  
**To:** Armando Benincasa  
**Subject:** RE: Arrow's Transfer

Do you want us to use this address:



Thanks  
Bill

**From:** Armando Benincasa [mailto:Armando.Benincasa@steeptoe-johnson.com]  
**Sent:** Thursday, November 08, 2012 2:14 PM  
**To:** Timmermeyer, William F  
**Subject:** Re: Arrow's Transfer

Please send those documents to Steve McGowan as General Counsel. Do you have his address?

**ARROW WV, INC.**  
An affiliate of the Boy Scouts of America  
1325 W. Walnut Hill Road  
Irving, Texas 75015-3079

West Virginia Department of Environmental Protection

Re: DEP Permit - Arrow WV, Inc.

Sir:

This letter serves to authorize Steven P. McCowan, General Counsel of Arrow WV, Inc., to sign documents on behalf of Arrow WV, Inc. pertaining to any permits issued to Arrow WV, Inc.

ARROW WV, INC.

BY: \_\_\_\_\_

John D. Puzat

ITS: \_\_\_\_\_

President





Chase Tower, Eighth Floor  
P.O. Box 1588  
Charleston, WV 25304-1588  
(304) 353-8000 (304) 353-8180 Fax  
www.steptoe-johnson.com

Write's Contact Information

(304) 353-8147  
Armando.Benincasa@steptoe-johnson.com

March 15, 2012

**Via Hand Delivery**

Yogesh Patel, P.E.  
Division of Water and Waste Management  
West Virginia Department of  
Environmental Protection  
601 5<sup>th</sup> Street SE  
Charleston, West Virginia 25304

RECEIVED MAR 16 2012

Re: Transfer of West Virginia National Pollutant Discharge  
Elimination System Permits from John D. Furst to Arrow WV, Inc.

Dear Mr. Patel:

Please accept this correspondence as formal notice to the West Virginia Department of Environmental Protection by and on behalf of John D. Furst, by counsel, of the transfer of legal responsibility for compliance with the terms and conditions of those WV/NPDES Permits set forth in attachment A to this letter formally issued to John D. Furst to Arrow WV, Inc., pursuant to 47 Code of State Regulation, Series 10-3.5.d.

In furtherance of this request and pursuant to the applicable regulation cited above, this request is made more than thirty days prior to formal transfer of permit responsibility which shall occur on May 7, 2012. Please find enclosed an original and two copies of Form WRD 10-64N executed by the parties as well as an original and two copies of a Letter Agreement executed by the parties setting forth the time and extent of transfer of permit responsibility.

Should you have any questions regarding this request, please contact me at (304) 353-8147. Thank you in advance for your time and attention to this matter.

Sincerely,

Armando Benincasa

Enclosure  
AFB/dav

cc: John D. Furst  
Arrow WV, Inc.

CH#570210v1

West Virginia • Ohio • Kentucky • Pennsylvania

TERRAJET  
TERRAJET

ATTACHMENT A

- 401 Certification No. WQC-10-0012, Issue Date 8/18/11 (The Summit);
- Permit No. WV0115924, Registration No. WVR105365, Issue Date 4/28/11 (The Summit - IRT Roads);
- Permit No. WV0115924, Registration No. WVR105492, Issue Date 5/13/11 (The Summit Bechtel Family Scout Reserve Road Around Lake A1);
- Permit No. WV0115924, Registration No. WVR105508, Issue Date 6/15/11 (AML Loop Road);
- Permit No. WV0115924, Registration No. WVR105641, Issue Date 8/10/11 (The Summit Bechtel Family National Scouting Reserve: Dams);
- Permit No. WV0115924, Registration No. WVR105669, Issue Date 11/9/11 (The Bechtel Summit - Camp D&E Access Road);
- Permit No. WV0115924, Registration No. WVR105670, Issue Date 10/28/11 (The Bechtel Summit - Glen Jean Entrance);
- Permit No. WV0115924, Registration No. WVR105757, Issue Date 12/6/11 (The Bechtel Summit - Core Road);
- Permit No. WV0115924, Registration No. WVR105766, Issue Date 10/6/11 (Summit Bechtel Reserve Water Tank Site and Access Road);
- Permit No. WV0115924, Registration No. WVR105808, Issue Date 10/27/11 (Water Tank Stockpile Site);
- Permit No. WV0115924, Registration No. WVR105829, Issue Date 11/22/11 (Waste Area 3/Dam Borrow Area);
- Permit No. WV0115924, Registration No. WVR105857, Issue Date 12/14/11 (Adult Camp Utility Corridor);
- Permit No. WV0115924, Registration No. WVR105872, Issue Date 2/24/12 (Logistics Access Road);
- Permit No. WV0115924, Registration No. WVR105892, Issue Date 1/19/12 (The Summit: Bechtel Family National Scouting Reserve : Dams A and 1.2);

**ATTACHMENT A CONTINUED**

Permit No. WV0115924, Registration No. WVR105896, Issue Date 2/9/12 (Sawmill Access Road);

Permit No. WV0115924, Registration No. WVR105931, Issue Date 2/15/12 (Village Core Tree House Site);

Permit No. WV0115924, Registration No. WVR105951, Issue Date 2/24/12 (Adventure Point Outlook).

WV8105766

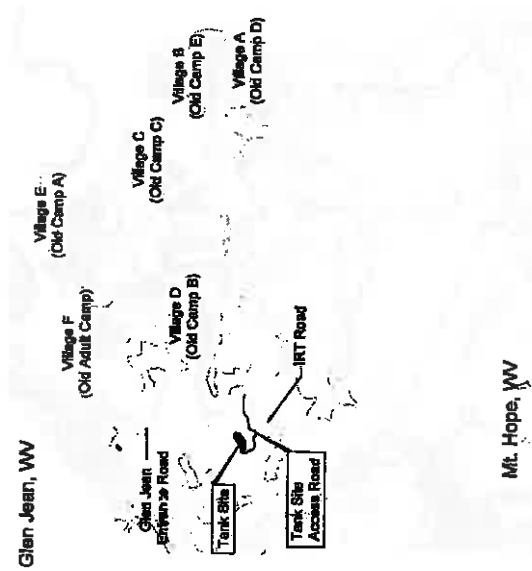
FILE

# THE SUMMIT

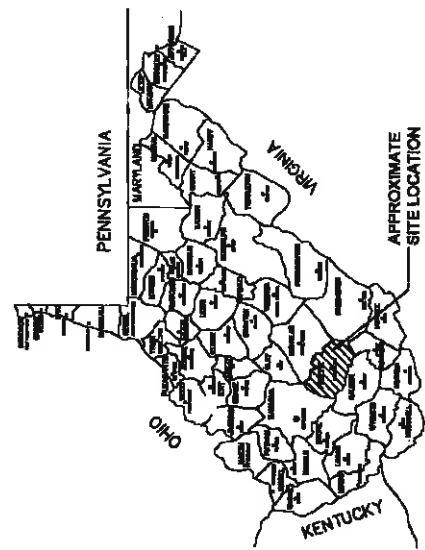
## BECHTEL RESERVE

### Erosion & Sedimentation Control Plan For Proposed Tank Site & Access Road

APPROVED



SCHEDULE OF DRAWINGS	
SHEET NO.	DRAWING TITLE
SE-1	COVER SHEET
SE-2	GENERAL EROSION CONTROL PLAN
SE-3	SEDIMENT AND EROSION CONTROL DETAILS
SE-4	SEDIMENT AND EROSION CONTROL DETAILS



PREPARED BY: **ERRADON**  
SUBMITTED TO WVDEP SEPTEMBER 14, 2011  
LAST REVISED: OCTOBER 4, 2011  
APPROVED 10/6/2011 BY WVDEP

PREPARED FOR:  
Trinity Works  
411 Main Street, Suite 210  
Mount Hope, WV 25880  
P: 304-877-7907  
F: 304-877-7908

THE SUMMIT  
BECHTEL RESERVE  
FAVETTE COUNTY, WEST VIRGINIA

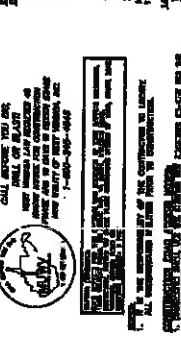
COVER SHEET

**ERRADON**  
Engineering, Planning, Architecture, Inc.  
2000 7th Street, SW  
Martinsburg, WV 25801  
P: 304-271-1111  
F: 304-271-1112

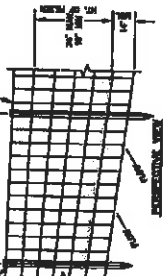
DATE	BY	CHKD	APPD
10/11/2011	J. H. H.	J. H. H.	J. H. H.

SE-0

100

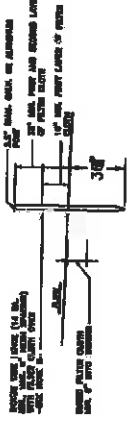
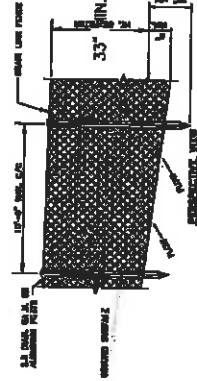


1. 15'-0" MAX. G.C.  
2. 12'-0" MAX. G.C.  
3. 10'-0" MAX. G.C.  
4. 8'-0" MAX. G.C.  
5. 6'-0" MAX. G.C.  
6. 4'-0" MAX. G.C.  
7. 3'-0" MAX. G.C.  
8. 2'-0" MAX. G.C.  
9. 1'-0" MAX. G.C.  
10. 0'-0" MAX. G.C.



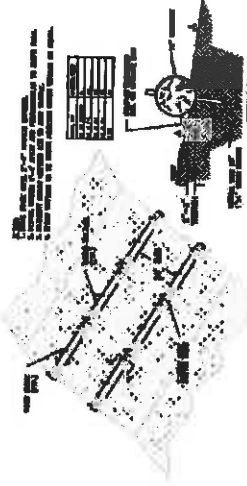
1. THE FENCE SHALL BE CONSTRUCTED OF 1/2" X 1/2" X 10' POSTS.
2. THE FENCE SHALL BE CONSTRUCTED OF 1/2" X 1/2" X 10' POSTS.
3. THE FENCE SHALL BE CONSTRUCTED OF 1/2" X 1/2" X 10' POSTS.
4. THE FENCE SHALL BE CONSTRUCTED OF 1/2" X 1/2" X 10' POSTS.
5. THE FENCE SHALL BE CONSTRUCTED OF 1/2" X 1/2" X 10' POSTS.
6. THE FENCE SHALL BE CONSTRUCTED OF 1/2" X 1/2" X 10' POSTS.

### 1. SALT FENCE DETAIL

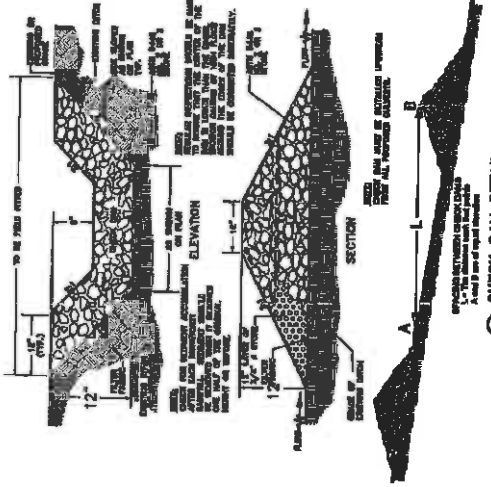


1. THE FENCE SHALL BE CONSTRUCTED OF 1/2" X 1/2" X 10' POSTS.
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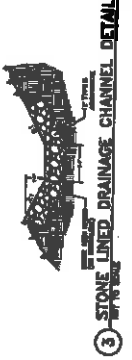
### 2. SUPER SALT FENCE DETAIL



### 3. STRAW WATTLE ANCHORING/ENTRENCHMENT DETAIL



### 2. CHECK DAM DETAIL



### 3. STONE LINED DRAINAGE CHANNEL DETAIL



### 4. GRASS LINED DRAINAGE CHANNEL DETAIL

LOCATION	DATE	BY	REVISION
1. 15'-0" MAX. G.C.	12/1/11	J. J. J.	1. 15'-0" MAX. G.C.
2. 12'-0" MAX. G.C.	12/1/11	J. J. J.	2. 12'-0" MAX. G.C.
3. 10'-0" MAX. G.C.	12/1/11	J. J. J.	3. 10'-0" MAX. G.C.
4. 8'-0" MAX. G.C.	12/1/11	J. J. J.	4. 8'-0" MAX. G.C.
5. 6'-0" MAX. G.C.	12/1/11	J. J. J.	5. 6'-0" MAX. G.C.
6. 4'-0" MAX. G.C.	12/1/11	J. J. J.	6. 4'-0" MAX. G.C.
7. 3'-0" MAX. G.C.	12/1/11	J. J. J.	7. 3'-0" MAX. G.C.
8. 2'-0" MAX. G.C.	12/1/11	J. J. J.	8. 2'-0" MAX. G.C.
9. 1'-0" MAX. G.C.	12/1/11	J. J. J.	9. 1'-0" MAX. G.C.
10. 0'-0" MAX. G.C.	12/1/11	J. J. J.	10. 0'-0" MAX. G.C.

NO.	DESCRIPTION	QUANTITY	UNIT	PRICE	TOTAL
1	15'-0" MAX. G.C.	1	1	1.00	1.00
2	12'-0" MAX. G.C.	1	1	1.00	1.00
3	10'-0" MAX. G.C.	1	1	1.00	1.00
4	8'-0" MAX. G.C.	1	1	1.00	1.00
5	6'-0" MAX. G.C.	1	1	1.00	1.00
6	4'-0" MAX. G.C.	1	1	1.00	1.00
7	3'-0" MAX. G.C.	1	1	1.00	1.00
8	2'-0" MAX. G.C.	1	1	1.00	1.00
9	1'-0" MAX. G.C.	1	1	1.00	1.00
10	0'-0" MAX. G.C.	1	1	1.00	1.00

TANK SITE & ACCESS ROAD GRADING  
FAVETTE COUNTY, WEST VIRGINIA  
THE SHAWMUT  
12/1/11

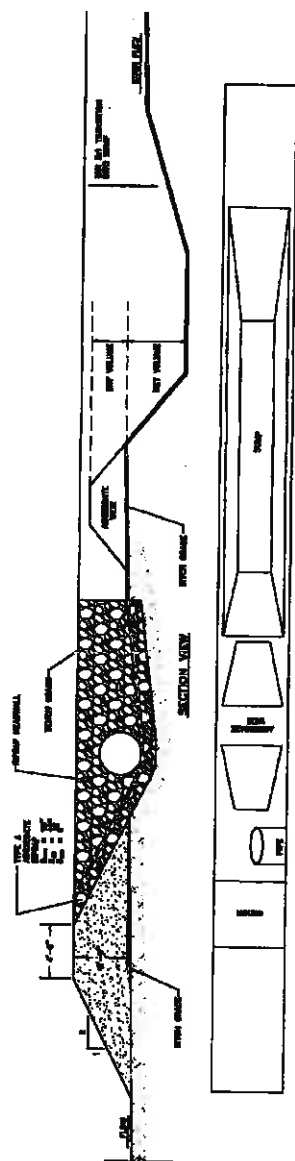
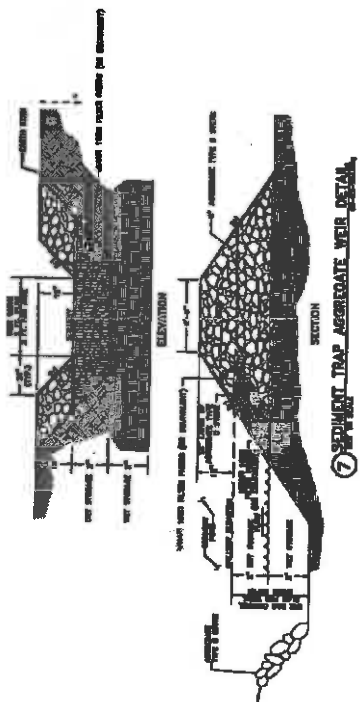
TERADON  
12/1/11

SE-2

For info on NPDES Storm  
Water Permit  
Call: 800-694-6227  
or Contact the National Stormwater  
Institute  
1001 17th Street, NW  
Washington, DC 20036  
Tel: 202-462-6000  
Fax: 202-462-6001  
Web: [www.nswi.org](http://www.nswi.org)

THIS BOX SHALL BE AT LEAST 4" x 14"  
POWERED AT LEAST 30" ABOVE GROUND.

**9 PUBLIC NOTICE SIGN**  
NOT TO SCALE



PLAN VIEW

NOTE: PLEASE REFER TO PLAN SHEETS FOR TYPE OF END SECTION/INLET

8 TEMPORARY INLET PROTECTION DETAIL

**DEP NPDESEP**

**From:** DEP NPDESEP  
**Sent:** Thursday, October 06, 2011 8:49 AM  
**To:** DEP NPDESEP; jhurst@hrcapital.com  
**Cc:** jeson.sabury@harradon.com; Grose, Megan E; Hendley, John H; Bandy, Jeremy W; Quinn, Deborah J  
**Subject:** Approval for WVR105766, Summit Bednal Reserve- Water Tank Site and Access Road, Fayette Co, 8.75 Acres  
**Attachments:** EP 14151\_2007\_Construction\_Storm\_Water\_General\_Permit[1].pdf; NOT 14400\_SW\_Cons\_Termination\_Notice.doc

John D. Furst  
PO Box 472  
Mount Hope, WV 25880  
817-332-3918

Physical Site Location: WV 16, Mt. Hope

Please be advised that this e-mail constitutes approval for your construction activity and your registration no. is WVR105766. You are now authorized to operate under WV/NPDBS General Water Pollution Control Permit No. WV0115924, issued on November 5, 2007, copy attached.

You should carefully read the contents of this General Permit and become familiar with all requirements needed to remain in compliance with your permit. We've also attached a "Notice of Termination" form to be completed and submitted when all disturbed areas are stabilized. You can find the permit and Notice of Termination form via the Internet by visiting Permitting, Division of Water and Waste Management at [www.wv.gov/dep](http://www.wv.gov/dep). Your annual permit fee has been assessed as \$500.00. You will be invoiced by this agency upon the anniversary date of this approval date. Failure to submit the annual fee within ninety (90) days of the due date will render your permit void upon the date you are mailed a certified written notice to that effect. Please be advised that a pro-rated annual permit fee may be assessed upon the completion date and proper stabilization.

Scott G. Mandrola, Director  
WV DEP-Division of Water & Waste Mgt.  
601 57<sup>th</sup> St. SE  
Charleston, WV 25304-2145  
Phone: (304) 926-0495  
Fax: (304) 926-0496



Revised  
R.D. 10/5/04  
File

REVISED: October 2009

GENERAL PERMIT REGISTRATION NO. WVB 105766  
(Official use only)

**SITE REGISTRATION INFORMATION FORM**  
**WANDEN CENTRAL TREATMENT PLANT DISINFECTION BY-PRODUCTS STORAGE WATER**  
**CHIEF ACCESS OPERATOR**

1. PROJECT NAME	Summit Bedrock Reserve - Water Tank Site and Access Road
2. APPLICANT'S NAME	John D. Furst
FEDERAL EMPLOYER IDENTIFICATION NUMBER *	27-0441319
* Required For Application Processing	
ADDRESS	P.O. Box 472 Mt. Hope, WV 25880
TELEPHONE	Office: 817-332-3918
E-MAIL ADDRESS	Cell: 817-999-0225 jfurst@summitbedrock.com
3. CONTACTOR ADDRESS	To Be Determined To Be Determined
TELEPHONE	( ) To Be Determined
4. PREPARER'S NAME ADDRESS	Teredon Corporation Attention: Jason Ashbury, ASLA P.O. Box 519 Nitro, WV 25143
TELEPHONE	304-755-8291
E-MAIL ADDRESS	jason.ashbury@teredon.com
5. ACRES DISTURBED	8.75
RAINFALL ZONE	3
APPLICATION FEE	\$1,170.00
6. LATITUDE DEGREES 37 MINUTES 54 SECONDS 52	
LONGITUDE DEGREES 81 MINUTES 09 SECONDS 10	
TOPOGRAPHIC MAP WITH SITE LOCATED (ATTACH COPY)	
7. NEAREST TOWN	Mt. Hope
COUNTY	Payson
COUNTY ROUTE	WV16
8. RECEIVING STREAM(S)	Barren Branch and Dunslop Creek
BASIN	Lower New River
MUNICIPAL SYSTEM OPERATOR	N/A
9. PROJECT DESCRIPTION	Water storage tank site and access road construction.

10. ESTIMATED START & COMPLETION DATES FOR PROJECT  
October 2011 to April 2012

11. CUBIC YARDS OF EXCAVATION (CUT/FILL) & WASTE/BORROW SITES  
(ATTACH SOILS REPORT)

76,187.66 CY Cut 2,665.65 Fill

73,922.01 CY Waste

Waste Material will be taken to previously approved waste site 2 near Camp A.

12. RELATIVE TIME LINE OF CONSTRUCTION ACTIVITIES

Sequence of events upon award of construction contract:

1. Installation of P&S controls (2 weeks)

2. Grading (4 weeks)

3. Tank Construction (14 weeks)

4. Final stabilization (2 weeks)

5. Remove P&S controls (2 weeks)

(Note: Some of these tasks will overlap)

NOTE: IF ANY OF THE FOLLOWING CONDITIONS APPLY, SUBMIT A NOTARIZED, SIGNED STATEMENT FOR BILLING SO THAT THE PROJECT CAN BE SENT OUT TO PUBLIC NOTICE

- GRADING PHASE OF CONSTRUCTION WILL LAST FOR 1 YEAR OR LONGER

- DISTURBANCE OF 100 ACRES OR MORE

- DISCHARGE TO OR UPSTREAM OF TIER 2.5 OR TIER 3 WATERS

SEE INSTRUCTIONS FOR DETAILS AND NOTICE PROCESS

13. NARRATIVE DESCRIPTION OF EROSION AND SEDIMENT CONTROLS

See Sheet SE-1 for narrative of erosion and sediment controls. A list of proposed controls is:

1. Silt fence

2. Mulching

3. Seeding - temporary and final

4. Gravel roadway stabilization

5. Pipe outlet protection

6. Culverts

7. Straw wattles

8. Slope matting

14. SEQUENCE OF CONSTRUCTION

See attached Sheet SE-1 for sequence of construction.

15. DETAILED SITE MAP(S) OF EROSION AND SEDIMENT CONTROLS (ATTACH)  
16. SITE MAP OF THE FINAL CONDITIONS SHOWING THE STORMWATER MANAGEMENT FACILITIES (ATTACH)

17. PRE- AND POST-DEVELOPMENT DRAINAGE AREA MAPS IDENTIFYING DISCHARGE POINTS AND SUPPORTING CALCULATIONS (ATTACH)

PRE-DEVELOPMENT PEAK DISCHARGE RATE(S) FOR 1 YR/24 HOUR STORM  
5.88 cfs

POST-DEVELOPMENT PEAK DISCHARGE RATE(S) FOR 1 YR/24 HOUR STORM  
6.47 cfs

18. NARRATIVE DESCRIPTION OF THE FINAL STORMWATER MANAGEMENT AND POLLUTION PREVENTION  
Stormwater is collected via the culverts and discharged in a safe manner down-slope to its original discharge point.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

19. DO YOU HAVE A PERMANENT STORMWATER MANAGEMENT FACILITY ON THIS PROJECT? CHECK THE APPROPRIATE BOX. IF YES, COMPLETE 19A.

☐ Yes.  
☒ No.

A. WHICH OF THE FOLLOWING BEST MANAGEMENT PRACTICES (BMPs) WILL BE UTILIZED FOR THIS PROJECT? ALSO, WHAT IS THE AMOUNT OF DRAINAGE ACREAGE (IN ACRES) THAT WILL FLOW THROUGH THESE BMPs WHILE ACTING AS PERMANENT STORMWATER MANAGEMENT FACILITIES?

\*LIST COORDINATES AND DRAINAGE FOR EACH POND SEPARATELY\*

☐ Dry Detention Ponds      Acres Drained: \_\_\_\_\_  
Latitude: \_\_\_\_\_ Longitude: \_\_\_\_\_

☐ Dry Extended Detention Ponds      Acres Drained: \_\_\_\_\_  
Latitude: \_\_\_\_\_ Longitude: \_\_\_\_\_

☐ Urban Infiltration Practices      Acres Drained: \_\_\_\_\_  
☐ Urban Filtering Practices      Acres Drained: \_\_\_\_\_  
☐ Wet Ponds and Wetlands      Acres Drained: \_\_\_\_\_  
Latitude: \_\_\_\_\_ Longitude: \_\_\_\_\_

Define each for the above list of BMPs may be found on Page 17 of the Instructions for Completing the Site Specific Stormwater Management Report.

20. PUBLIC NOTICE SIGN (SEE INSTRUCTIONS AND SECTION G.4.b.6 OF THE GENERAL

PERMIT). ALL APPLICANTS ARE REQUIRED TO POST A PUBLIC NOTICE SIGN ONSITE WITHIN 24 HOURS OF SUBMITTING AN APPLICATION. ATTACH SITE SPECIFIC TEMPLATE.

\*\*\*\*\*  
BY COMPLETING AND SUBMITTING THIS APPLICATION, I HAVE REVIEWED AND UNDERSTAND AND AGREE TO THE TERMS AND CONDITIONS OF THE GENERAL PERMIT ISSUED ON NOVEMBER 5, 2007. I UNDERSTAND THAT PROVISIONS OF THE PERMIT ARE ENFORCEABLE BY LAW. VIOLATION OF ANY TERM AND CONDITION OF THE GENERAL PERMIT AND/OR OTHER APPLICABLE LAW OR REGULATIONS CAN LEAD TO ENFORCEMENT ACTION.

I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED ON THIS FORM AND ALL ATTACHMENTS AND THAT, BASED ON MY INQUIRING OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, THE INFORMATION SUBMITTED IS, TO THE BEST OF MY KNOWLEDGE AND BELIEF, TRUE, ACCURATE, AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT.

OFFICIAL SIGNATURE \_\_\_\_\_

DATE \_\_\_\_\_

PRINT NAME \_\_\_\_\_

PRIOR TO FILING THIS APPLICATION, YOU MAY WISH TO OBTAIN A COPY OF THE LEGISLATIVE RULES OF THE DEPARTMENT OF ENVIRONMENTAL PROTECTION, TITLE 47, SERIES 26, WATER POLLUTION CONTROL PERMIT FEE SCHEDULE IN ORDER TO DETERMINE THE APPROPRIATE PERMIT APPLICATION FEE REQUIRED TO ACCOMPANY YOUR SUBMISSION OF THIS APPLICATION. YOU CAN OBTAIN A COPY OF THE REGULATION FROM THE SECRETARY OF STATE'S OFFICE, STATE CAPITOL BUILDING, CHARLESTON, WV 25305. HOWEVER, YOU MAY WISH TO USE THE TABLE FOUND IN ITEM V. OF THE ATTACHED INSTRUCTIONS.

YOUR CHECK OR MONEY ORDER FOR THE APPROPRIATE APPLICATION FEE MUST BE MADE PAYABLE TO THE WEST VIRGINIA DEPARTMENT OF ENVIRONMENTAL PROTECTION.

*We will process your personal information (email address, mailing address and/or telephone number) in accordance with the State of West Virginia's Privacy Policy for appropriate and customary business purposes. Your personal information may be disclosed to other State agencies or third parties in the normal course of business or as needed to comply with statutory or regulatory requirements, including Freedom of Information Act requests. The Division of Water and Waste Management will appropriately secure your personal information. If you have any questions about our use of your personal information, please contact the DEP's Chief Privacy officer at [deprivacy@dep.state.wv.us](mailto:deprivacy@dep.state.wv.us).*

ALL SPILLS OR ACCIDENTAL DISCHARGES ARE REQUIRED TO BE REPORTED IMMEDIATELY TO THE EMERGENCY RESPONSE SPILL ALERT SYSTEM TOLL FREE TELEPHONE NUMBER 1-800-642-3074. CALLS FROM OUT OF STATE SHOULD BE MADE TO 304-343-1899.

REVISED: October 2009

GENERAL PERMIT REGISTRATION NO. WVR 105766

(Print name)

**SITE REGISTRATION APPLICATION FORM**  
**WV STATE OF GENERAL PERMIT CONSTRUCTION STORMWATER**  
**(THREE ACRES OR GREATER)**

1. PROJECT NAME Summit Bechtel Reserve - Water Tank Site and Access Road

2. APPLICANT'S NAME John D. First

FEDERAL EMPLOYER IDENTIFICATION NUMBER \* 000000000

\* Required For Application Processing

ADDRESS

P.O. Box 472

Mt. Hope, WV 25850

TELEPHONE

Office: 817-332-3918

Cell: 817-998-0235

E-MAIL ADDRESS

first@hessental.com

3. CONTRACTOR

ADDRESS

To Be Determined

To Be Determined

TELEPHONE

( ) To Be Determined

4. PREPARER'S NAME

ADDRESS

Terradon Corporation

Attention: Jason Ashbury, ASLA

P.O. Box 519

Niote, WV 25143

304-755-8291

jason.ashbury@terraddon.com

5. ACRES DISTURBED

8.75

RAINFALL ZONE

3

APPLICATION FEE

\$1,170.00

6. LATITUDE DEGREES 37 MINUTES 54 SECONDS 52

LONGITUDE DEGREES 81 MINUTES 09 SECONDS 10

TOPOGRAPHIC MAP WITH SITE LOCATED (ATTACH COPY)

7. NEAREST TOWN

COUNTY

COUNTY ROUTE

Mt. Hope

Fayette

WV16

8. RECEIVING STREAM(S)

BASIN

MUNICIPAL SYSTEM OPERATOR

Barren Branch and Dumbleup Creek

Lower New River

N/A

9. PROJECT DESCRIPTION

Water storage tank site and access road construction.

RECEIVED SEP 28 2011

10. ESTIMATED START & COMPLETION DATES FOR PROJECT  
October 2011 to November 2012

11. CUBIC YARDS OF EXCAVATION (CUT/FILL) & WASTE/BORROW SITES  
(ATTACH SOILS REPORT)

76,187.66 CY Cut 2,265.65 FILL

73,922.01 CY Waste

See attached drawing of location of waste area no. 3.

12. RELATIVE TIME LINE OF CONSTRUCTION ACTIVITIES

Sequence of events upon award of construction contract:

1. Installation of E&S controls (2 weeks)

2. Grading (4 weeks)

3. Tank Construction (40 weeks)

4. Final stabilization (2 weeks)

5. Remove E&S controls (2 weeks)

(Note: Some of these tasks will overlap)

NOTE: IF ANY OF THE FOLLOWING CONDITIONS APPLY, SUBMIT A NOTARIZED, SIGNED STATEMENT FOR FILING SO THAT THE PROJECT CAN BE SENT OUT TO PUBLIC NOTICE

• GRADING PHASE OF CONSTRUCTION WILL LAST FOR 1 YEAR OR LONGER

• DISTURBANCE OF 100 ACRES OR MORE

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SEE INSTRUCTIONS FOR DETAILS AND NOTICE PROCESS

13. NARRATIVE DESCRIPTION OF EROSION AND SEDIMENT CONTROLS

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1. Silt fence

2. Mulching

3. Seeding - temporary and final

4. Gravel roadway stabilization

5. Pipe outlet protection

6. Culverts

7. Straw wattles

8. Slope matting

14. SEQUENCE OF CONSTRUCTION

See attached Sheet SE-1 for sequence of construction.

RECEIVED SEP 28 2011

15. DETAILED SITE MAP(S) OF EROSION AND SEDIMENT CONTROLS (ATTACH)  
16. SITE MAP OF THE FINAL CONDITIONS SHOWING THE STORMWATER MANAGEMENT FACILITIES (ATTACH)

17. PRE- AND POST-DEVELOPMENT DRAINAGE AREA MAPS IDENTIFYING DISCHARGE POINTS AND SUPPORTING CALCULATIONS (ATTACH)

PRE-DEVELOPMENT PEAK DISCHARGE RATE(S) FOR 1YR/24 HOUR STORM  
5.83 cfs

POST-DEVELOPMENT PEAK DISCHARGE RATE(S) FOR 1YR/24 HOUR STORM  
6.47 cfs

18. NARRATIVE DESCRIPTION OF THE FINAL STORMWATER MANAGEMENT AND POLLUTION PREVENTION

Stormwater is collected via the culverts and discharged in a safe manner down-slope to its original discharge point.

19. DO YOU HAVE A PERMANENT STORMWATER MANAGEMENT FACILITY ON THIS PROJECT? CHECK THE APPROPRIATE BOX. IF YES, COMPLETE 19A.

☐ Yes  
☒ No

A. WHICH OF THE FOLLOWING BEST MANAGEMENT PRACTICES (BMPs) WILL BE UTILIZED FOR THIS PROJECT? ALSO, WHAT IS THE AMOUNT OF DRAINAGE ACREAGE (IN ACRES) THAT WILL FLOW THROUGH THESE BMPs WHILE ACTING AS PERMANENT STORMWATER MANAGEMENT FACILITIES?  
\*LIST COORDINATES AND DRAINAGE FOR EACH POND SEPARATELY\*

☐ Dry Detention Ponds      Acres Drained: \_\_\_\_\_  
Latitude: \_\_\_\_\_ Longitude: \_\_\_\_\_

☐ Dry Extended Detention Ponds      Acres Drained: \_\_\_\_\_  
Latitude: \_\_\_\_\_ Longitude: \_\_\_\_\_

☐ Urban Infiltration Practices      Acres Drained: \_\_\_\_\_  
Latitude: \_\_\_\_\_ Longitude: \_\_\_\_\_

☐ Urban Filtering Practices      Acres Drained: \_\_\_\_\_  
Latitude: \_\_\_\_\_ Longitude: \_\_\_\_\_

☐ Wet Ponds and Wetlands      Acres Drained: \_\_\_\_\_  
Latitude: \_\_\_\_\_ Longitude: \_\_\_\_\_

Definition for the above list of BMPs may be found on Page 17 of the Instructions for Completing the Site Application Package.

20. PUBLIC NOTICE SIGN (SEE INSTRUCTIONS AND SECTION G.4.b.6 OF THE GENERAL

RECEIVED SEP 23 2001

PERMIT). ALL APPLICANTS ARE REQUIRED TO POST A PUBLIC NOTICE SIGN ON SITE WITHIN 24 HOURS OF SUBMITTING AN APPLICATION. ATTACH SITE SPECIFIC TEMPLATE.

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OFFICIAL SIGNATURE Jack O. First DATE 9-13-11

PRINT NAME Jack O. First

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RECEIVED SEP 23 2011

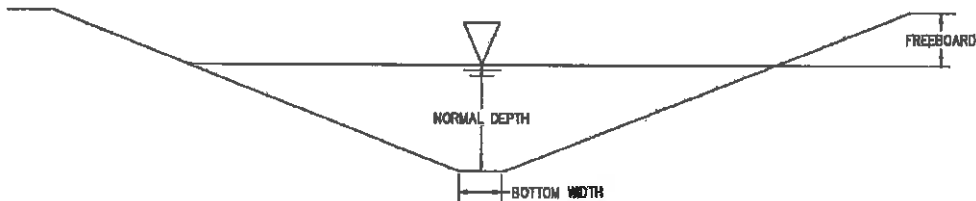


# Water Tank Site Drainage Calculations

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**SWALES - WATER TANK SITE - PERMANENT EROSION CONTROL**

SWALE I.D.	SLOPE ft/ft	Qd cfs	WIDTH ft	10-YR NORMAL DEPTH ft	LEFT SIDE SLOPE x:1	RIGHT SIDE SLOPE x:1	VELOCITY fps	SHEAR STRESS lbs/sf	EROSION PROTECTION	REMARKS
Swale to Drainage Point 1	0.1038	1.36	1	0.21	3	3	3.97	1.36	TYPE A MATTING	
Swale to Drainage Point 2	0.0683	2.38	1	0.32	3	3	3.70	1.38	TYPE A MATTING	
Swale to Drainage Point 3	0.0950	0.93	1	0.50	3	3	0.74	2.97	TYPE A MATTING	
Swale to Drainage Point 4	0.0991	4.60	1	0.40	3	3	5.23	2.47	TYPE A MATTING	
Swale to Drainage Point 5	0.0488	2.19	1	0.33	3	3	3.33	1.01	GRASS	
Swale to Drainage Point 6	0.0676	2.15	1	0.30	3	3	3.77	1.27	TYPE A MATTING	



Pre and Post Development Flow Calculations (Flow Values in cfs)								
Drainage Area	Pre-Development Flow				Post-Development Flow			
	1 Year	10 Year	25 Year	1 Year	10 Year	25 Year	1 Year	25 Year
1	0.58	1.34	1.77	0.61	1.36	1.80	0.61	1.80
2	0.81	2.04	2.78	1.02	2.38	3.16	1.02	3.16
3	0.33	0.81	1.10	0.41	0.93	1.24	0.41	1.24
4	1.59	4.04	5.50	1.97	4.60	6.12	1.97	6.12
5	0.76	1.89	2.56	0.96	2.19	2.90	0.96	2.90
6	1.37	3.55	4.85	1.56	3.75	5.03	1.56	5.03
7	2.36	6.06	8.26	3.00	6.97	9.26	3.00	9.26
8	2.06	4.75	6.29	2.53	5.38	6.99	2.53	6.99
9	0.72	1.84	2.51	0.92	2.15	2.85	0.92	2.85
Total Flow	8.58	23.69	32.73	10.80	26.68	35.97	10.80	35.97

**Water Tank Site**  
**Post-Development Calculations**  
**Contract U13**

***1 Year Storm***

Lawrence Hale  
Terradon Corporation  
401 Jacobson Drive  
Poca, WV 25143  
Phone: (304)-755-8291

## General Information

**Storm Information:**

Storm Type:	NRCS Type II
Design Storm:	1 yr - 24 hr
Rainfall Depth:	2.380 inches

### Structure Networking:

Type	Stru #	(Flow Into)	Stru #	Musk K (hrs)	Musk X	Description
Null	#1	==>	End	0.000	0.000	Total Outflow
Culvert	#2	==>	#1	0.000	0.000	Discharge Point 1 (HDPE CULVERT #1)
Culvert	#3	==>	#1	0.000	0.000	Discharge Point 2 (HDPE CULVERT #2)
Culvert	#4	==>	#1	0.000	0.000	Discharge Point 3 (HDPE CULVERT #3)
Culvert	#5	==>	#1	0.000	0.000	Discharge Point 4 (HDPE CULVERT #4)
Culvert	#6	==>	#1	0.000	0.000	Discharge Point 5 (HDPE CULVERT #5)
Null	#7	==>	#1	0.000	0.000	Discharge Point 6
Null	#8	==>	#1	0.000	0.000	Discharge Point 7
Null	#9	==>	#1	0.000	0.000	Discharge Point 8
Null	#10	==>	#1	0.000	0.000	Discharge Point 9

CF	#10
Null	Null
CF	#9
Null	Null
CF	#8
Null	Null
CF	#7
Null	Null
CF	#6
Culvert	Culvert
CF	#5
Culvert	Culvert
CF	#4
Culvert	Culvert
CF	#3
Culvert	Culvert
CF	#2
Culvert	Culvert
#1	Null

**Structure Summary:**

	Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#10	1.680	1.680	0.92	0.09
#9	3.510	3.510	2.53	0.18
#8	5.470	5.470	3.00	0.28
#7	3.290	3.290	1.56	0.17
#6	1.630	1.630	0.96	0.08
#5	3.590	3.590	1.97	0.19
#4	0.690	0.690	0.41	0.04
#3	1.820	1.820	1.02	0.09
#2	0.990	0.990	0.61	0.05
#1	0.000	22.670	10.80	1.17

### Structure Detail:

Structure #10 (Null)

Discharge Point 9

Structure #9 (Null)

Discharge Point 8

Structure #8 (Null)

Discharge Point 7

Structure #7 (Null)

Discharge Point 6

Structure #6 (Culvert)

Discharge Point 5 (HDPE CULVERT #5)

Culvert Inputs:

Length (ft)	Slope (%)	Manning's n	Max. Headwater (ft)	Tailwater (ft)	Entrance Loss Coef. (K <sub>e</sub> )
43.20	7.33	0.0140	1.50	0.00	0.90

Culvert Results:

Design Discharge = 0.96 cfs

Minimum pipe diameter: 1 - 6 inch pipe(s) required

Structure #5 (Culvert)

Discharge Point 4 (HDPE CULVERT #4)

Culvert Inputs:

Length (ft)	Slope (%)	Manning's n	Max. Headwater (ft)	Tailwater (ft)	Entrance Loss Coef. (K <sub>e</sub> )
29.70	10.66	0.0140	1.50	0.00	0.90

Culvert Results:

Design Discharge = 1.97 cfs

Minimum pipe diameter: 1 - 10 inch pipe(s) required

Structure #4 (Culvert)

Discharge Point 3 (HDPE CULVERT #3)



Culvert Inputs:

Length (ft)	Slope (%)	Manning's n	Max. Headwater (ft)	Tailwater (ft)	Entrance Loss Coef. (K <sub>e</sub> )
33.27	9.52	0.0140	1.00	0.00	0.50

Culvert Results:

Design Discharge = 0.41 cfs  
Minimum pipe diameter: 1 - 6 inch pipe(s) required

*Structure #3 (Culvert)*

*Discharge Point 2 (HDPE CULVERT #2)*

Culvert Inputs:

Length (ft)	Slope (%)	Manning's n	Max. Headwater (ft)	Tailwater (ft)	Entrance Loss Coef. (K <sub>e</sub> )
33.27	9.52	0.0140	1.20	0.00	0.50

Culvert Results:

Design Discharge = 1.02 cfs  
Minimum pipe diameter: 1 - 8 inch pipe(s) required

*Structure #2 (Culvert)*

*Discharge Point 1 (HDPE CULVERT #1)*

Culvert Inputs:

Length (ft)	Slope (%)	Manning's n	Max. Headwater (ft)	Tailwater (ft)	Entrance Loss Coef. (K <sub>e</sub> )
31.85	9.95	0.0140	1.00	0.00	0.50

Culvert Results:

Design Discharge = 0.61 cfs  
Minimum pipe diameter: 1 - 6 inch pipe(s) required

*Structure #1 (Null)*

*Total Outflow*

### Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X (hrs)	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#10	1	1.680	0.255	0.000	0.000	76.000	TR55	0.92	0.086
	<b>Σ</b>	<b>1.680</b>						<b>0.92</b>	<b>0.086</b>
#9	1	3.510	0.122	0.000	0.000	76.000	TR55	2.53	0.182
	<b>Σ</b>	<b>3.510</b>						<b>2.53</b>	<b>0.182</b>
#8	1	5.470	0.258	0.000	0.000	76.000	TR55	3.00	0.281
	<b>Σ</b>	<b>5.470</b>						<b>3.00</b>	<b>0.281</b>
#7	1	3.290	0.397	0.000	0.000	76.000	TR55	1.56	0.170
	<b>Σ</b>	<b>3.290</b>						<b>1.56</b>	<b>0.170</b>
#6	1	1.630	0.189	0.000	0.000	76.000	TR55	0.96	0.084
	<b>Σ</b>	<b>1.630</b>						<b>0.96</b>	<b>0.084</b>
#5	1	3.590	0.264	0.000	0.000	76.000	TR55	1.97	0.187
	<b>Σ</b>	<b>3.590</b>						<b>1.97</b>	<b>0.187</b>
#4	1	0.690	0.192	0.000	0.000	76.000	TR55	0.41	0.036
	<b>Σ</b>	<b>0.690</b>						<b>0.41</b>	<b>0.036</b>
#3	1	1.820	0.237	0.000	0.000	76.000	TR55	1.02	0.094
	<b>Σ</b>	<b>1.820</b>						<b>1.02</b>	<b>0.094</b>
#2	1	0.990	0.125	0.000	0.000	76.000	TR55	0.61	0.052
	<b>Σ</b>	<b>0.990</b>						<b>0.61</b>	<b>0.052</b>
#1	<b>Σ</b>	<b>11.670</b>						<b>10.90</b>	<b>1.173</b>

### Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#2	1	1. Forest with heavy ground litter	10.57	39.00	369.00	0.820	0.125
#3	1	Time of Concentration					<b>0.128</b>
#3	1	1. Forest with heavy ground litter	9.42	62.00	658.00	0.770	0.237
	<b>Σ</b>						<b>0.237</b>
#4	1	Time of Concentration					<b>0.192</b>
#4	1	1. Forest with heavy ground litter	12.97	82.00	632.00	0.910	0.192
	<b>Σ</b>						<b>0.192</b>
#5	1	Time of Concentration					<b>0.264</b>
#5	1	1. Forest with heavy ground litter	12.85	110.00	856.00	0.900	0.264
	<b>Σ</b>						<b>0.264</b>
#6	1	Time of Concentration					<b>0.189</b>
#6	1	1. Forest with heavy ground litter	15.86	108.00	681.00	1.000	0.189

# **SEDCAD 4 for Windows**

Procedural 1008.27111 Details | Overview

8

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#6	1	Time of Concentration					0.189
#7	1	1. Forest with heavy ground litter	9.51	106.00	1,115.00	0.780	0.397
#7	1	Time of Concentration					0.397
#8	1	1. Forest with heavy ground litter	22.60	252.00	1,115.00	1.200	0.258
#8	1	Time of Concentration					0.258
#9	1	1. Forest with heavy ground litter	20.12	100.00	497.00	1.130	0.122
#9	1	Time of Concentration					0.122
#10	1	1. Forest with heavy ground litter	10.05	74.00	736.00	0.800	0.255
#10	1	Time of Concentration					0.255

**Water Tank Site**  
**Post-Development Calculations**  
**Contract U13**

***10 Year Storm***

Lawrence Hale  
Terradon Corporation  
401 Jacobson Drive  
Poca, WV 25143  
Phone: (304)-755-8291

## General Information

**Storm Information:**

Storm Type:	NRCS Type II
Design Storm:	10 yr - 24 hr
Rainfall Depth:	3.530 inches

### Structure Networking:

Type	Stru #	Flow (mgd)	Stru #	Musk. K (lbs)	Musk. X	Description
Null	#1	==>	End	0.000	0.000	Total Outflow
Culvert	#2	==>	#1	0.000	0.000	Discharge Point 1 (HOPE CULVERT #1)
Culvert	#3	==>	#1	0.000	0.000	Discharge Point 2 (HOPE CULVERT #2)
Culvert	#4	==>	#1	0.000	0.000	Discharge Point 3 (HOPE CULVERT #3)
Culvert	#5	==>	#1	0.000	0.000	Discharge Point 4 (HOPE CULVERT #4)
Culvert	#6	==>	#1	0.000	0.000	Discharge Point 5 (HOPE CULVERT #5)
Null	#7	==>	#1	0.000	0.000	Discharge Point 6
Null	#8	==>	#1	0.000	0.000	Discharge Point 7
Null	#9	==>	#1	0.000	0.000	Discharge Point 8
Null	#10	==>	#1	0.000	0.000	Discharge Point 9

#10	Null
#9	Null
#8	Null
#7	Null
#6	Culvert
#5	Culvert
#4	Culvert
#3	Culvert
#2	Culvert
#1	Null

**Structure Summary:**

	Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#10	1.680	1.680	2.15	0.19
#9	3.510	3.510	5.38	0.41
#8	5.470	5.470	6.97	0.62
#7	3.290	3.290	3.76	0.38
#6	1.630	1.630	2.19	0.19
#5	3.590	3.590	4.60	0.42
#4	0.690	0.690	0.93	0.08
#3	1.820	1.820	2.38	0.21
#2	0.990	0.990	1.36	0.12
#1	0.000	22.670	26.68	2.61

### Structure Detail:

Structure #10 (Null)

Discharge Point 9

Structure #9 (Null)

Discharge Point 8

Structure #8 (Null)

Discharge Point 7

Structure #7 (Null)

Discharge Point 6

Structure #6 (Culvert)

Discharge Point 5 (HDPE CULVERT #5)

Culvert Inputs:

Length (ft)	Slope (%)	Manning's n	Max. Headwater (ft)	Tailwater (ft)	Entrance Loss Coef. (K <sub>e</sub> )
43.20	7.33	0.0140	1.50	0.00	0.50

Culvert Results:

Design Discharge = 2.19 cfs

Minimum pipe diameter: 1 - 10 inch pipe(s) required

Structure #5 (Culvert)

Discharge Point 4 (HDPE CULVERT #4)

Culvert Inputs:

Length (ft)	Slope (%)	Manning's n	Max. Headwater (ft)	Tailwater (ft)	Entrance Loss Coef. (K <sub>e</sub> )
29.70	10.66	0.0140	1.60	0.00	0.50

Culvert Results:

Design Discharge = 4.60 cfs

Minimum pipe diameter: 1 - 15 inch pipe(s) required

Structure #4 (Culvert)

Discharge Point 3 (HDPE CULVERT #3)



Culvert Inputs:

Length (ft)	Slope (%)	Manning's n	Max. Headwater (ft)	Tailwater (ft)	Entrance Loss Coef. (K <sub>e</sub> )
33.27	9.52	0.0140	1.00	0.00	0.90

Culvert Results:

Design Discharge = 0.93 cfs  
Minimum pipe diameter: 1 - 8 inch pipe(s) required

Structure #3 (Culvert)

Discharge Point 2 (HDPE CULVERT #2)

Culvert Inputs:

Length (ft)	Slope (%)	Manning's n	Max. Headwater (ft)	Tailwater (ft)	Entrance Loss Coef. (K <sub>e</sub> )
33.27	9.52	0.0140	1.20	0.00	0.90

Culvert Results:

Design Discharge = 2.38 cfs  
Minimum pipe diameter: 1 - 12 inch pipe(s) required

Structure #2 (Culvert)

Discharge Point 1 (HDPE CULVERT #1)

Culvert Inputs:

Length (ft)	Slope (%)	Manning's n	Max. Headwater (ft)	Tailwater (ft)	Entrance Loss Coef. (K <sub>e</sub> )
31.85	9.95	0.0140	1.00	0.00	0.90

Culvert Results:

Design Discharge = 1.36 cfs  
Minimum pipe diameter: 1 - 10 inch pipe(s) required

Structure #1 (Null)

Total Outflow

### Subwatershed Hydrology Detail:

Stn #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X (hrs)	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#10	1	1.680	0.255	0.000	0.000	76.000	TR55	2.15	0.192
	<b>Σ</b>	<b>1.680</b>						<b>2.15</b>	<b>0.192</b>
#9	1	3.510	0.122	0.000	0.000	76.000	TR55	5.38	0.405
	<b>Σ</b>	<b>3.510</b>						<b>5.38</b>	<b>0.405</b>
#8	1	5.470	0.258	0.000	0.000	76.000	TR55	6.97	0.625
	<b>Σ</b>	<b>5.470</b>						<b>6.97</b>	<b>0.625</b>
#7	1	3.290	0.397	0.000	0.000	76.000	TR55	3.76	0.378
	<b>Σ</b>	<b>3.290</b>						<b>3.76</b>	<b>0.378</b>
#6	1	1.630	0.169	0.000	0.000	76.000	TR55	2.19	0.187
	<b>Σ</b>	<b>1.630</b>						<b>2.19</b>	<b>0.187</b>
#5	1	3.590	0.264	0.000	0.000	76.000	TR55	4.60	0.416
	<b>Σ</b>	<b>3.590</b>						<b>4.60</b>	<b>0.416</b>
#4	1	0.690	0.192	0.000	0.000	76.000	TR55	0.93	0.080
	<b>Σ</b>	<b>0.690</b>						<b>0.93</b>	<b>0.080</b>
#3	1	1.820	0.237	0.000	0.000	76.000	TR55	2.38	0.210
	<b>Σ</b>	<b>1.820</b>						<b>2.38</b>	<b>0.210</b>
#2	1	0.990	0.125	0.000	0.000	76.000	TR55	1.36	0.116
	<b>Σ</b>	<b>0.990</b>						<b>1.36</b>	<b>0.116</b>
#1	<b>Σ</b>	<b>21.670</b>						<b>26.66</b>	<b>2.610</b>

### Subwatershed Time of Concentration Details:

Stn #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#2	1	1. Forest with heavy ground litter	10.57	39.00	349.00	0.820	0.125
#3	1	Time of Concentration:					<b>0.125</b>
#4	1	1. Forest with heavy ground litter	9.42	62.00	638.00	0.770	0.237
#5	1	Time of Concentration:					<b>0.237</b>
#6	1	1. Forest with heavy ground litter	12.97	82.00	632.00	0.910	0.192
#7	1	Time of Concentration:					<b>0.192</b>
#8	1	1. Forest with heavy ground litter	12.85	110.00	856.00	0.900	0.264
#9	1	Time of Concentration:					<b>0.264</b>
#10	1	1. Forest with heavy ground litter	15.86	108.00	681.00	1.000	0.189

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Stn #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#6	1	Time of Concentration					0.189
#7	1	1. Forest with heavy ground litter	9.51	106.00	1,115.00	0.780	0.397
#7	1	Time of Concentration					0.397
#8	1	1. Forest with heavy ground litter	23.60	252.00	1,115.00	1.200	0.258
#8	1	Time of Concentration					0.258
#9	1	1. Forest with heavy ground litter	20.12	100.00	492.00	1.130	0.122
#9	1	Time of Concentration					0.122
#10	1	1. Forest with heavy ground litter	10.05	74.00	756.00	0.800	0.255
#10	1	Time of Concentration					0.255

**Water Tank Site**  
**Post-Development Calculations**  
**Contract U13**

*25 Year Storm*

Lawrence Hale  
Terradon Corporation  
401 Jacobson Drive  
Poca, WV 25143  
Phone: (304)-755-8291

**General Information**

**Storm Information:**

Storm Type:	NRCS Type II
Design Storm:	25 yr - 24 hr
Rainfall Depth:	4.130 inches

### **Structure Networking:**

Type	Stru #	(flows into)	Stru #	Mult. K (Hz)	Mult. X	Description
Null	#1	==>	End	0.000	0.000	Total Outflow
Culvert	#2	==>	#1	0.000	0.000	Discharge Point 1 (HDPE CULVERT #1)
Culvert	#3	==>	#1	0.000	0.000	Discharge Point 2 (HDPE CULVERT #2)
Culvert	#4	==>	#1	0.000	0.000	Discharge Point 3 (HDPE CULVERT #3)
Culvert	#5	==>	#1	0.000	0.000	Discharge Point 4 (HDPE CULVERT #4)
Culvert	#6	==>	#1	0.000	0.000	Discharge Point 5 (HDPE CULVERT #5)
Null	#7	==>	#1	0.000	0.000	Discharge Point 6
Null	#8	==>	#1	0.000	0.000	Discharge Point 7
Null	#9	==>	#1	0.000	0.000	Discharge Point 8
Null	#10	==>	#1	0.000	0.000	Discharge Point 9

#10	#9	#8	#7	#6	#5	#4	#3	#2	#1
GF	GF	GF	GF	GF	GF	GF	GF	GF	GF
Null	Null	Null	Null	Chert	Chert	Chert	Chert	Chert	Null

### Structure Summary:

	Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#10	1.680	1.680	2.85	0.25
#9	3.510	3.510	6.99	0.54
#8	5.470	5.470	9.26	0.63
#7	3.290	3.290	5.03	0.50
#6	1.630	1.630	2.90	0.25
#5	3.590	3.590	6.12	0.55
#4	0.680	0.680	1.24	0.11
#3	1.820	1.820	3.16	0.28
#2	0.990	0.990	1.80	0.15
#1	0.000	22.670	35.97	3.46

**Discharge Point 5 (HDPE CULVERT #5)**

Length (ft)	Slope (%)	Manning's n	Max. Headwater (ft)	Tailwater (ft)	Entrance Loss Coef. (No)
43.20	7.33	0.0140	1.50	0.00	0.90

**Minimum pipe diameter: 1 - 12 inch pipe(s) required**

**Discharge Point 4 (HDPE CULVERT #4)**

Length (ft)	Slope (%)	Manning's n	Max. Headwater (ft)	Tailwater (ft)	Entrance Loss Coef. (Nc)
29.70	10.55	0.0140	1.50	0.00	0.90

**Minimum pipe diameter: 1 - 21 inch pipe(s) required**

**Discharge Point 3 (HDPE CULVERT #3)**



Culvert Inputs:

Length (ft)	Slope (%)	Manning's n	Max. Headwater (ft)	Tailwater (ft)	Entrance Loss Coef. (Kc)
33.27	9.52	0.0140	1.00	0.00	0.90

Culvert Results:

Design Discharge = 1.24 cfs  
 Minimum pipe diameter: 1 - 8 inch pipe(s) required

*Structure #3 (Culvert)*

*Discharge Point 2 (HDPE CULVERT #2)*

Culvert Inputs:

Length (ft)	Slope (%)	Manning's n	Max. Headwater (ft)	Tailwater (ft)	Entrance Loss Coef. (Kc)
33.27	9.52	0.0140	1.20	0.00	0.90

Culvert Results:

Design Discharge = 3.16 cfs  
 Minimum pipe diameter: 1 - 15 inch pipe(s) required

*Structure #2 (Culvert)*

*Discharge Point 1 (HDPE CULVERT #1)*

Culvert Inputs:

Length (ft)	Slope (%)	Manning's n	Max. Headwater (ft)	Tailwater (ft)	Entrance Loss Coef. (Kc)
31.85	9.95	0.0140	1.20	0.00	0.90

Culvert Results:

Design Discharge = 1.80 cfs  
 Minimum pipe diameter: 1 - 12 inch pipe(s) required

*Structure #1 (Well)*

*Total Outflow:*

### Subwatershed Hydrology Detail:

SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X (hrs)	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#10	1	1.680	0.255	0.000	76.000	TR55	2.85	0.235
<b>Σ</b>	<b>1.680</b>						<b>2.85</b>	<b>0.235</b>
#9	1	3.510	0.122	0.000	76.000	TR55	6.99	0.537
<b>Σ</b>	<b>3.510</b>						<b>6.99</b>	<b>0.537</b>
#8	1	5.470	0.258	0.000	76.000	TR55	9.26	0.828
<b>Σ</b>	<b>5.470</b>						<b>9.26</b>	<b>0.828</b>
#7	1	3.290	0.367	0.000	76.000	TR55	5.03	0.502
<b>Σ</b>	<b>3.290</b>						<b>5.03</b>	<b>0.502</b>
#6	1	1.630	0.189	0.000	76.000	TR55	2.90	0.248
<b>Σ</b>	<b>1.630</b>						<b>2.90</b>	<b>0.248</b>
#5	1	3.590	0.264	0.000	76.000	TR55	6.12	0.552
<b>Σ</b>	<b>3.590</b>						<b>6.12</b>	<b>0.552</b>
#4	1	0.890	0.192	0.000	76.000	TR55	1.24	0.106
<b>Σ</b>	<b>0.890</b>						<b>1.24</b>	<b>0.106</b>
#3	1	1.820	0.237	0.000	76.000	TR55	3.16	0.279
<b>Σ</b>	<b>1.820</b>						<b>3.16</b>	<b>0.279</b>
#2	1	0.990	0.125	0.000	76.000	TR55	1.80	0.154
<b>Σ</b>	<b>0.990</b>						<b>1.80</b>	<b>0.154</b>
#1	<b>Σ</b>	<b>22.070</b>					<b>35.97</b>	<b>3.460</b>

### Subwatershed Time of Concentration Details:

SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (ft/s)	Time (hrs)
#2	1. Forest with heavy ground litter	10.57	39.00	565.00	0.820	0.125
<b>Σ</b>	<b>Time of Concentration</b>					<b>0.125</b>
#3	1. Forest with heavy ground litter	9.42	62.00	658.00	0.770	0.237
<b>Σ</b>	<b>Time of Concentration</b>					<b>0.237</b>
#4	1. Forest with heavy ground litter	12.97	82.00	632.00	0.910	0.192
<b>Σ</b>	<b>Time of Concentration</b>					<b>0.192</b>
#5	1. Forest with heavy ground litter	12.85	110.00	856.00	0.900	0.264
<b>Σ</b>	<b>Time of Concentration</b>					<b>0.264</b>
#6	1. Forest with heavy ground litter	15.86	108.00	681.00	1.000	0.189

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Stru #	SWS #	Land Flow Condition	Slope (%)	Vent. Dist. (ft)	Horiz. Dist. (ft)	Velocity (ft/s)	Time (hrs)
#6	1	Time of Concentration					0.189
#7	1	1. Forest with heavy ground litter	9.51	106.00	1,115.00	0.780	0.397
#7	1	Time of Concentration					0.397
#8	1	1. Forest with heavy ground litter	22.60	252.00	1,115.00	1.200	0.258
#8	1	Time of Concentration					0.258
#9	1	1. Forest with heavy ground litter	20.12	100.00	497.00	1.130	0.122
#9	1	Time of Concentration					0.122
#10	1	1. Forest with heavy ground litter	10.05	74.00	736.00	0.800	0.255
#10	1	Time of Concentration					0.255

**Water Tank Site**  
**Pre-Development Calculations**  
**Contract U13**

*1 Year Storm*

Lawrence Hale  
Terradon Corporation  
401 Jacobson Drive  
Poco, WV 25143  
Phone: (304) 755-6291

### General Information

#### Storm Information:

Storm Type:	NRCS Type II
Design Storm:	1 yr - 24 hr
Rainfall Depth:	2.380 inches

### Structure Networking:

Type	Stru #	Rows Info	Stru #	Musk. K (ms)	Musk. X	Description
Null	#1	==>	End	0.000	0.000	Total Outflow
Null	#2	==>	#1	0.000	0.000	Discharge Point 1
Null	#3	==>	#1	0.000	0.000	Discharge Point 2
Null	#4	==>	#1	0.000	0.000	Discharge Point 3
Null	#5	==>	#1	0.000	0.000	Discharge Point 4
Null	#6	==>	#1	0.000	0.000	Discharge Point 5
Null	#7	==>	#1	0.000	0.000	Discharge Point 6
Null	#8	==>	#1	0.000	0.000	Discharge Point 7
Null	#9	==>	#1	0.000	0.000	Discharge Point 8
Null	#10	==>	#1	0.000	0.000	Discharge Point 9

#10	Null
#9	Null
#8	Null
#7	Null
#6	Null
#5	Null
#4	Null
#3	Null
#2	Null
#1	Null

### Structure Summary:

	Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#10	1.680	1.680	0.72	0.07
#9	3.510	3.510	2.06	0.15
#8	5.470	5.470	2.36	0.23
#7	3.290	3.290	1.37	0.14
#6	1.630	1.630	0.76	0.07
#5	3.590	3.590	1.59	0.15
#4	0.690	0.690	0.33	0.03
#3	1.820	1.820	0.81	0.07
#2	0.990	0.990	0.58	0.04
#1	0.000	22.670	8.58	0.95

**Structure Detail:**

**UNIT 10# structures**

**Discharge Point 9**

**CHINA 6# AIRPORTS**

### Discharge Print 8

**Structure #8 (Null)**

**Discharge Print 7**

**Structure #7 (Aval)**

**Discharge Point 6**

**Structure #6 (Null)**

### Discharge Point 5

**Structure #5 (New)**

**Discharge Point 4**

Structure #4 (Nile)

### Discharge Point 3

Structure #3 (N:HL)

**Discharge Print 2**

**Structure #2 (Mid)**

**Discharge Print 1**

**Structure #1 (NH<sub>2</sub>)**

**Total Outflow**



Stn. #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#10	1	1.680	0.255	0.000	0.000	73.000	TR55	0.72	0.070
	Σ	1.680						0.72	0.070
#9	1	3.510	0.111	0.000	0.000	73.000	TR55	2.06	0.147
	Σ	3.510						2.06	0.147
#8	1	5.470	0.247	0.000	0.000	73.000	TR55	2.36	0.229
	Σ	5.470						2.36	0.229
#7	1	3.290	0.281	0.000	0.000	73.000	TR55	1.37	0.138
	Σ	3.290						1.37	0.138
#6	1	1.630	0.169	0.000	0.000	73.000	TR55	0.76	0.068
	Σ	1.630						0.76	0.068
#5	1	3.390	0.233	0.000	0.000	73.000	TR55	1.59	0.151
	Σ	3.390						1.59	0.151
#4	1	0.690	0.175	0.000	0.000	73.000	TR55	0.33	0.029
	Σ	0.690						0.33	0.029
#3	1	1.820	0.210	0.000	0.000	73.000	TR55	0.81	0.074
	Σ	1.820						0.81	0.074
#2	1	0.990	0.107	0.000	0.000	73.000	TR55	0.38	0.042
	Σ	0.990						0.38	0.042
#1	Σ	22.670						8.58	0.947

### Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#2	1	1. Forest with heavy ground litter	14.36	53.00	369.00	0.950	0.107
#2	1	Time of Concentration:					0.107
#3	1	1. Forest with heavy ground litter	12.01	79.00	658.00	0.970	0.210
#3	1	Time of Concentration:					0.210
#4	1	1. Forest with heavy ground litter	15.82	100.00	632.00	1.000	0.175
#4	1	Time of Concentration:					0.175
#5	1	1. Forest with heavy ground litter	16.36	140.00	856.00	1.020	0.233
#5	1	Time of Concentration:					0.233
#6	1	1. Forest with heavy ground litter	15.86	106.00	661.00	1.000	0.189

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Stn #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#6	1	Time of Concentration					0.169
#7	1	1. Forest with heavy ground litter	18.92	211.00	1,115.00	1.100	0.281
#7	1	Time of Concentration					0.281
#8	1	1. Forest with heavy ground litter	24.57	274.00	1,115.00	1.250	0.247
#8	1	Time of Concentration					0.247
#9	1	1. Forest with heavy ground litter	24.14	120.00	497.00	1.240	0.111
#9	1	Time of Concentration					0.111
#10	1	1. Forest with heavy ground litter	10.05	74.00	796.00	0.800	0.255
#10	1	Time of Concentration					0.255

**Water Tank Site**  
**Pre-Development Calculations**  
**Contract U13**

***10 Year Storm***

Lawrence Hale  
Terradon Corporation  
401 Jacobson Drive  
Poca, WV 25143  
Phone: (304)-755-8291

### ***General Information***

#### ***Storm Information:***

Storm Type:	NRCS Type II
Design Storm:	10 yr - 24 hr
Rainfall Depth:	3.530 inches

**Structure Networking:**

Type	Stru #	Flows Into	Stru #	Musk. K (hrs)	Musk. X	Description
Null	#1	==>	End	0.000	0.000	Total Outflow
Null	#2	==>	#1	0.000	0.000	Discharge Point 1
Null	#3	==>	#1	0.000	0.000	Discharge Point 2
Null	#4	==>	#1	0.000	0.000	Discharge Point 3
Null	#5	==>	#1	0.000	0.000	Discharge Point 4
Null	#6	==>	#1	0.000	0.000	Discharge Point 5
Null	#7	==>	#1	0.000	0.000	Discharge Point 6
Null	#8	==>	#1	0.000	0.000	Discharge Point 7
Null	#9	==>	#1	0.000	0.000	Discharge Point 8
Null	#10	==>	#1	0.000	0.000	Discharge Point 9

GF	#10	Null
GF	#9	Null
GF	#8	Null
GF	#7	Null
GF	#6	Null
GF	#5	Null
GF	#4	Null
GF	#3	Null
GF	#2	Null
#1	Null	

### Structure Summary:

	Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#10	1.680	1.680	1.84	0.17
#9	3.510	3.510	4.75	0.35
#8	5.470	5.470	6.06	0.54
#7	3.290	3.290	3.55	0.33
#6	1.630	1.630	1.89	0.16
#5	3.590	3.590	4.04	0.36
#4	0.690	0.690	0.81	0.07
#3	1.820	1.820	2.04	0.18
#2	0.990	0.990	1.34	0.10
#1	0.000	22.670	21.69	2.25

**Structure Detail:**

Structure #10 (Null)  
Discharge Point 9  
Structure #9 (Null)  
Discharge Point 8  
Structure #8 (Null)  
Discharge Point 7  
Structure #7 (Null)  
Discharge Point 6  
Structure #6 (Null)  
Discharge Point 5  
Structure #5 (Null)  
Discharge Point 4  
Structure #4 (Null)  
Discharge Point 3  
Structure #3 (Null)  
Discharge Point 2  
Structure #2 (Null)  
Discharge Point 1  
Structure #1 (Null)  
Total Outflow





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Stn #	SWS #	Land Use Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (ft/s)	Time (hrs)
#6	1	Time of Concentration:					0.189
#7	1	1. Forest with heavy ground litter	18.92	211.00	1,115.00	1.100	0.281
#7	1	Time of Concentration:					0.281
#8	1	1. Forest with heavy ground litter	24.57	274.00	1,115.00	1.250	0.247
#8	1	Time of Concentration:					0.247
#9	1	1. Forest with heavy ground litter	24.14	120.00	497.00	1.240	0.111
#9	1	Time of Concentration:					0.111
#10	1	1. Forest with heavy ground litter	10.05	74.00	796.00	0.800	0.255
#10	1	Time of Concentration:					0.255

**Water Tank Site**  
**Pre-Development Calculations**  
**Contract U13**

***25 Year Storm***

Lawrence Hale  
Tennadon Corporation  
401 Jacobson Drive  
Poco, WV 25143  
Phone: (304) 755-8291

### General Information

#### Storm Information:

Storm Type:	NRCS Type II
Design Storm:	25 yr - 24 hr
Rainfall Depth:	4.130 inches

**Structure Networking:**

Type	Stru #	Flow #	Musk, K (ms)	Musk, X	Description
Null	#1	End	0.000	0.000	Total Outflow
Null	#2	==> #1	0.000	0.000	Discharge Point 1
Null	#3	==> #1	0.000	0.000	Discharge Point 2
Null	#4	==> #1	0.000	0.000	Discharge Point 3
Null	#5	==> #1	0.000	0.000	Discharge Point 4
Null	#6	==> #1	0.000	0.000	Discharge Point 5
Null	#7	==> #1	0.000	0.000	Discharge Point 6
Null	#8	==> #1	0.000	0.000	Discharge Point 7
Null	#9	==> #1	0.000	0.000	Discharge Point 8
Null	#10	==> #1	0.000	0.000	Discharge Point 9

CF	#10	Null
CF	#9	Null
CF	#8	Null
CF	#7	Null
CF	#6	Null
CF	#5	Null
CF	#4	Null
CF	#3	Null
CF	#2	Null
CF	#1	Null

# Structure Summary:

	Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#10	1.680	1.680	2.51	0.22
#9	3.510	3.510	6.29	0.47
#8	5.470	5.470	9.26	0.74
#7	3.280	3.280	4.85	0.44
#6	1.630	1.630	2.56	0.22
#5	3.590	3.590	5.50	0.49
#4	0.690	0.690	1.10	0.09
#3	1.820	1.820	2.78	0.24
#2	0.990	0.990	1.77	0.13
#1	0.000	22.670	32.73	3.05

Structure #10 (NIN)

**Structure #9 (Null)**

**Discharge, Point 8**

### Structure #8 (Null)

**Structure #7 (Null)**

Structure #6 (Null)

Structure #5 (Nail)

Discharge Print 4

## Structure 24 (Null)

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**Total Outflow:**

2000

### Subwatershed Hydrology Detail:

Stn #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk X (hrs)	Curve Number	LHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#10	1	1.680	0.235	0.000	73.000	TR55	2.51	0.225
	Σ	1.680					2.51	0.225
#9	1	3.510	0.111	0.000	73.000	TR55	6.29	0.474
	Σ	3.510					6.29	0.474
#8	1	5.470	0.247	0.000	73.000	TR55	8.26	0.735
	Σ	5.470					8.26	0.735
#7	1	3.290	0.281	0.000	73.000	TR55	4.85	0.443
	Σ	3.290					4.85	0.443
#6	1	1.630	0.109	0.000	73.000	TR55	2.56	0.219
	Σ	1.630					2.56	0.219
#5	1	3.590	0.233	0.000	73.000	TR55	5.50	0.485
	Σ	3.590					5.50	0.485
#4	1	0.690	0.175	0.000	73.000	TR55	1.10	0.094
	Σ	0.690					1.10	0.094
#3	1	1.820	0.210	0.000	73.000	TR55	2.78	0.238
	Σ	1.820					2.78	0.238
#2	1	0.990	0.107	0.000	73.000	TR55	1.77	0.133
	Σ	0.990					1.77	0.133
#1	Σ	22.670					32.73	3.046

### Subwatershed Time of Concentration Details:

Stn #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#2	1	1. Forest with heavy ground litter	14.36	53.00	365.00	0.950	0.107
#3	1	Time of Concentration					0.407
#4	1	1. Forest with heavy ground litter	12.01	79.00	538.00	0.870	0.210
#5	1	Time of Concentration					0.219
#6	1	1. Forest with heavy ground litter	15.82	100.00	632.00	1.000	0.175
#7	1	Time of Concentration					0.175
#8	1	1. Forest with heavy ground litter	16.36	140.00	856.00	1.020	0.233
#9	1	Time of Concentration					0.233
#10	1	1. Forest with heavy ground litter	15.86	106.00	681.00	1.000	0.189

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STU #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#6	1	Time of Concentration:					
#7	1	1. Forest with heavy ground litter	18.92	211.00	1,115.00	1.100	0.281
#7	1	Time of Concentration:					0.281
#8	1	1. Forest with heavy ground litter	24.57	274.00	1,115.00	1.250	0.247
#8	1	Time of Concentration:					0.247
#9	1	1. Forest with heavy ground litter	24.14	120.00	497.00	1.240	0.111
#9	1	Time of Concentration:					0.111
#10	1	1. Forest with heavy ground litter	10.05	74.00	736.00	0.800	0.255
#10	1	Time of Concentration:					0.255





## TRANSMITTAL LETTER

**Mailing Address:**  
P.O. Box 519  
Nitro, WV 25143

**Shipping Address:**  
Rock Branch Industrial Park  
401 Leeborn Drive  
Poca, WV 25159

**Phone:** (304) 755-8291  
**Fax:** (304) 755-2636  
**Internet:** <http://www.terradon.com>

**Date:** September 22, 2011

**To:** Megan Grose  
West Virginia Department Environmental Protection  
Division of Water and Waste Management  
Construction NPDES  
901 57<sup>th</sup> Street, SE  
Charleston, WV 25304

**Project Number:** 10910-0029

**Sender:** Jason Asbury

**Via:** ☐ Mail ☐ Federal Express ☐ DHL  
☐ UPS ☒ Hand Delivered ☐ Picked up at TERRADON

**Description of Item(s):**

- 3 - copies of plans (Tank Access and Water Tank Site)
- 3 - copies of stormwater calculations
- 1 - copy of application
- 1 - submission fee check

**Remarks:**

For your review and comment

**CC:** file

RECEIVED SEP 23 2011